DOCUMENT RESUME

ED 153 431 EC 110 380

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TITLE Two Case Studies in Cognitive Development.
PUB DATE May 78
NOTE 17p.; Paper presented at the Annual International Convention, The Council for Exceptional Children (56th, Kansas City, Missouri, May 2-5, 1978, Session Th81); This study was partially supported by a van Leer Foundation Grant; Print may not reproduce well in hard copy; For related information, see EC 110 381

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Case Studies; Early Childhood Education; *Economically Disadvantaged; *Educational Technology; Electromechanical Aids; *Handicapped Children; *Intervention; Longitudinal Studies; *Program Effectiveness; Urban Youth
IDENTIFIERS *Self Controlled Interactive Learning Systems

ABSTRACT

The paper presents case studies of two low income inner-city children who, after entering an early childhood program at ages 2 and 3, demonstrated increased reading and academic skills as well as improved social-emotional development. The intervention program (Self-Controlled Interactive Learning Systems) is explained to have incorporated an educational technology component including special courseware and equipment (a "talking typewriter", "talking page", and voice-mirror). Longitudinal data on both students is provided. (CL)

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ED153431

TWO CASE STUDIES IN COGNITIVE DEVELOPMENT

A NINE YEAR REPORT (1969-1978)*

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Council for Exceptional Children
56th Annual International Convention
Kansas City, May 4, 1978

EC 110 380

*This study was partially supported by a van Leer Foundation Grant to D. Steg. Appreciation is gratefully acknowledged. Hardware and OR Software is from Prentice Hall Developmental Learning Systems.

TWO CASE STUDIES IN COGNITIVE DEVELOPMENT: A NINE YEAR REPORT

In 1967, the Department of Human Behavior at Drexel University incorporated an educational technology program, Self-Controlled Interactive Learning Systems (SCILS), into its ongoing early childhood program at the Drexel Early Childhood Center. The SCILS component of the center's program consists of equipment, a "talking-typewriter," "talking-page," and voice-mirror, and two types of courseware, courseware designed at Drexel (the Drexel courseware) and courseware designed by the manufacturers of the equipment (linguistic and oralographic courseware).

There were several reasons for introducing the SCILS program to the Drexel center. First, the design characteristics of the SCILS system allow for active learning. The equipment and courseware allow child control of the environment, engage the child in visual, listening, tactile and speech activities, and provide instantaneous feedback through which the child can guide his actions. Second, educational technology offers educators a new option for management of time. The proper use of technology is training. With educational technology being used to teach skills, the classroom teacher is free to concentrate on

educational activities, activities which lead to new concept formation. Thus at the Drexel Center children spend a maximum of 15 to 30 minutes of an 8 to 10 hour day with the SCILS program. The rest of their time is used in art, music, play and discovery activities common to the best of traditional nursery schools. Third, the increasing recognition of a lack of functional literacy in the population requires the exploration and application of new techniques which can fulfill our expectation that everyone become literate. Fifty per-cent of the children at the Drexel Center are low-income, inner city children. It is this population which is most at risk in terms of not attaining future functional literacy. The SCILS program was introduced as a way to decrease that risk and longitudinal results to date show that it is effective in doing so. Every child who had 30 hours or more of instructional time on SCILS during their early childhood years (3 to 6 years) is currently reading at or above grade level in school. The grade range of these children is first through seventh grade, a fact which indicates that gains are sustained.

The longitudinal data provides evidence for the instructional effectiveness of SCILS. Another way to assess the program's effectiveness is through a careful examination of the progress of individual children.

This paper reports on the two most difficult children who entered the program during the last eleven years and their subsequent progress.

For Child A. the psychological report reads as follows:

A. was admitted to the Center in September, 1969, when approximately three years old. At that time a battery of tests were administered to evaluate her intellectual, perceptual, and psycholinguistic functioning levels. Intellectually she was performing as a borderline mental defective. Her perceptual skills were impossible to measure. Due to profound perceptual inadequacies, no score was obtainable on the Illinois Test of Psycholinguistic Abilities. Her emotional behavior was characterized by flatness of affect, extremely short attention span, perserveration, and symptoms of low self-esteem. Considerable prodding was necessary to obtain responses even to comparably simple test items. Symptoms of malnutrition were also in evidence. During each year at the center she received the same evaluations noted above. After the first year, and each year thereafter, continual progress in intellectual,perceptual and psycholinguistic functioning was observed. Her emotional behavior improved markedly. At the time of the testing of 6/72 her mental age was slightly above her chronological age. Her ITPA score was a half year above chronological expectation. Her word recognition skills were at the middle of the first grade level. During the testing situation she was alert and quick, readily engaging the examiner in playful banter. She appeared extremely self-confident. She attempted every item despite difficulty of the material. The final testing revealed a youngster who appeared happy with hersel, self-confident and anxious to do well. Her academic skills were well within the first grade level although she was not yet in first grade. Prognosis for this child is excellent.

Following is an excerpt from a teacher's annual report:

A. is presently a six year old Negro female well developed physically. She lives with her mother, father (who has recently completed a prison sentence) and 12 year old brother, son of her father by a previous marriage.

The focus of this report is the school year 1971-1972. During this time, teachers have been focusing on three areas of A's development: her physical maturity which led her to prefer the company of older children, especially teen-agers; her extreme caution in entering an endeavor in which failure is a possibility; and her seemingly purposeless behavior.

A. was an isolate within her group and turned to adults as the major source of support. A's kindergarten unit consisted of boys who formed a group exclusive of girls, two boys who played with both sexes, one boy who was an isolate, and three girls who formed a cluster and with whom A. had infrequent interaction. These girls did not exclude A. and seemed to regard her as a leader when she joined their activities. The one girl with whom A. interacted frequently was transferred to another class as their behavior was extremely disruptive and A. dominated the relationship to such an extent that the other child was unable to initiate and direct her activities. Additionally, there had been incidents of sexual precocity involving A. and a boy in the class.

Two things seemed to help A. during the school year. Her teachers made a consistent effort to have A. help them in the classroom. Whereas in the beginning she would often retreat to a chair and pout, with all efforts to talk with her achieving little, she later was able to discuss those things which disturbed her. Gradually she became more responsive to the affections of the teachers and was able to initiate activities and contact with others. This made it easier to have A. become involved in classroom activities, especially those which she previously might have regarded as threatening. Also, given A's proclivity towards older individuals, the teachers and college students provided A. with positive role models.

A second course of action which seems to have benefitted A. is her work with the typewriter. As the year progressed, and as A. went from letter recognition to some word recognition, she frequently requested turns at the typewriter. A high point of the year involved a story A. had written. It was a rather long story, yet every day A. requested to go to the non-automated typewriter to type it. At times, A. would tell the operator that she would not be able to finish the story. She was also reluctant to terminate the sessions, even after half an hour. With some encouragement and with the operator determining A's point of fatigue, A. finished the story after two weeks. In view of her past fear of failure and inattentiveness , this was indeed a significant accomplishment. Using the Dukane viewer, she began to develop a sight vocabulary, and to request to use the viewer daily. Finally, when in the classroom or on class trips, whenever she waw a word she would ask the teacher what it was, often spelling the word and saying it after having it read to her. In summary, it appears that the experience with the typewriter has enabled her to acquire basic reading skills, persistence and to enjoy learning.

A. has now had six years of additional schooling since the above case study report in "Deviation-Amplifying Processes and Individual Growth and Behavior." (1) Her last evaluation was completed in April of 1978, with a chronological age of 11-10 in grade 6.

During her 1977 testing, she obtained a WISC*score of 110, high normal. A. has continued to make steady, even progress in achievement. For example her Wide Range Arithmetic Test grade scores went from 2.8 in 1974 to 4.2 in 1975, 5.3 in 1976, 5.9 in 1977.* Much the same story can be told through a longitudinal focus on word recognition and reading comprehension. grade scores in word recognition (Wide Range) went from 3.8 in 1974, to 4.5 in 1975, to 5.5 in 1976, to 6.8 in 1977 to 7.0 in 1978; her instructional level in reading comprehension went from grade 2 in 1974 to grade 3 in 1975 and to grade 4 in 1976. Her current Spache instructional level is 6.5, her independent level is 7.5.

Thus, A. is at or above grade expectation in all the major indices of achievement. Academic prognosis continues to be excellent.

For the first time in 1978, an affective measure was introduced, Tasks of Emotional Development. (2) Children were asked to interpret pictures related to

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* Test score not available for 1978

three areas of emotional development, socialization, aggression and attitude towards learning. The tester's analysis of A's responses follows:

With few exeptions A.'s responses were in the highest category (the higher the category, the more emotionally mature). In all 3 situations she perceived the situation properly and the outcomes she chose for the stories were positive. Her affect in aggression and learning were the highest possible. Only in the expression of affect for socialization did A. not perform in the higher categories. A. was spontaneous in her responses and few probes were needed.

The overall picture of A. provided by the T.E.D. test is one of a quite well adjusted child who is able to perceive emotional confrontation appropriately, who socializes well with her peers, who is capable of handling aggression, who has a positive attitude toward learning and who can speak spontaneously and forthrightly about an emotion-packed situation.

For child T. the psychological report reads as follows:

T. first came to the Center at the age of 2-11, in September of 1970. At that time he presented a lamentable picture. T. was quite thin, exhibiting many symptoms typically associated with undernourishment. He received the typical battery of tests to evaluate intellectual status, as well as to obtain indices of perceptual and psycholinguistic behavior. At that time he proved untestable. "It was difficult to ascertain if he even understood what was expected of him. His speech was barely intelligible: he exhibited articulation difficulties as well as non-fluency patterns. His fine-motor coordination was quite poor. His gait was awkward. His social and mental maturity was estimated at the one year old level. Initially, his progress was slow indeed. Nevertheless, during his second year at the Center his social and emotional development, which appeared arrested during the entire first year, began to show definite indications of accelerating. He was then able to establish peer group relations although he was still generally quite apprehensive and was extremely solicitous with peers in his attempts to maintain friendships. During this second year, his intellectual and achievement levels were still markedly retarded. During his third year

his social-emotional development accelerated at a rapid rate. He began to exhibit self-confidence and much stabler peer relationships. His social maturity level now closely approximates chronological expectation. Intellectually, he is now functioning within the borderline range. His global score on the ITPA is at the third year level. Visual and auditory perception have improved substantially. He is now able to handle basic mathematical concepts while his word recognition score on the Wide Range scale is the 1.1 level.

In summary, the belief here is that this youngster has made remarkable overall improvement. Had he not received an early intervention program, the six year old briefly described here would almost certainly be facing an uncertain school career, probably marked by severe social and emotional inadequacies. Instead, T.'s general prognosis can be characterized as fair to good, depending upon the quality of educational, social and emotional opportunities.

Teacher's report from the year 1971-1972:

T. is a six year old Negro male. He was preceeded at the center by his now seven year old brother. Presently his four year old brother attends the Center and plans are being made for the attendance of his two year old sister. T. lives with his brothers, sister and mother. Intermittently, his father returns home. The father's latest absence has been due to a prison sentence.

When 3 year old T. first came to the Center, a staff member was assigned to him as he often ran to hide in small, dark places. When not hiding, he would watch the older children but seldom engaged in play. His major form of communication was tantrums.

Perhaps the most outstanding characteristic of T. is his visual acuity and imagination. In the beginning he was seeking dark secluded places. As time went on, however, this imagination and acuity began to present itself overtly. Once, when T. was gazing at a painting in a secluded living room, T. suddenly turned to the teacher and said he was afraid and wanted to leave. The painting contained dark colors and was of people in a narrow street circa 1870. At another time, T. was staring at the face of a college student. Upon completing his assessment, he told the student, "Your face looks like an egg." And indeed the symmetry of this student's oval features was accurately and artistically stated by T.

T.'s experiences on the typewriter ranged from sessions which had to be terminated because of disruptive behavior (raising the plasticized cover of the keyboard's inner workings, which would have made the typewriter inoperative) to T.'s excitedly running out of the booth when he had made a new discovery. In the beginning, he would often request that the light in the typewriter booth be turned off while he typed. It was six months before T. showed letter recognition; at this point, he recognized "T" the first letter in his name. As was to happen whenever T. made a discovery, he continually typed "T" for a number of sessions. Once he ran out of the booth and excitedly said "Gee! I'm smart! In another instance, T. was typing numbers; when he typed "zero" he ran out of the booth shouting, "Zero, I typed zero, zero means nothing." Many sessions after this event consisted of T's typing "zero." The same persistent interest shown in the letter "T" and "zero" was applied by T. in learning his first word "owl." T. had shown great interest in a puzzle picture of an owl. A typewriter program about an owl was written. He repeatedly requested this story. Thus, on the typewriter, he continuously revealed an intense style of learning, completely exhausting one item before discovering another.

T. left the center in June of 1972. His verbal communication was quite fluent and contributed greatly to his sense of humor. By the time he left, T. took a healthy pleasure in teasing his teachers.

As with child A, T. has now had six years of schooling since the above case study report. (1) His last evaluation was completed in April, 1978, with a chronological age of 11-5.

During his 1977 testing, he obtained a WISC*score of 111, high normal. In the achievement area, T. continues to make very substantial progess. His present Wide Range Reading score is at the 10.1 grade level. His instructional level on the Spache scale is currently 6.5, his independent level 7.5.

When consideration is given to where he was-in terms of intellectual and perceptual development-in 1970, his present performance is nothing short of remarkable. Had T. followed

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*Test not given in 1978

A. SCILS TIME-33HRS.,11MIN.
ECC-33 MOS.

GRAPHIC REPRESENTATION
OF
LONGITUDINAL
ACHIEVEMENT CHILD A

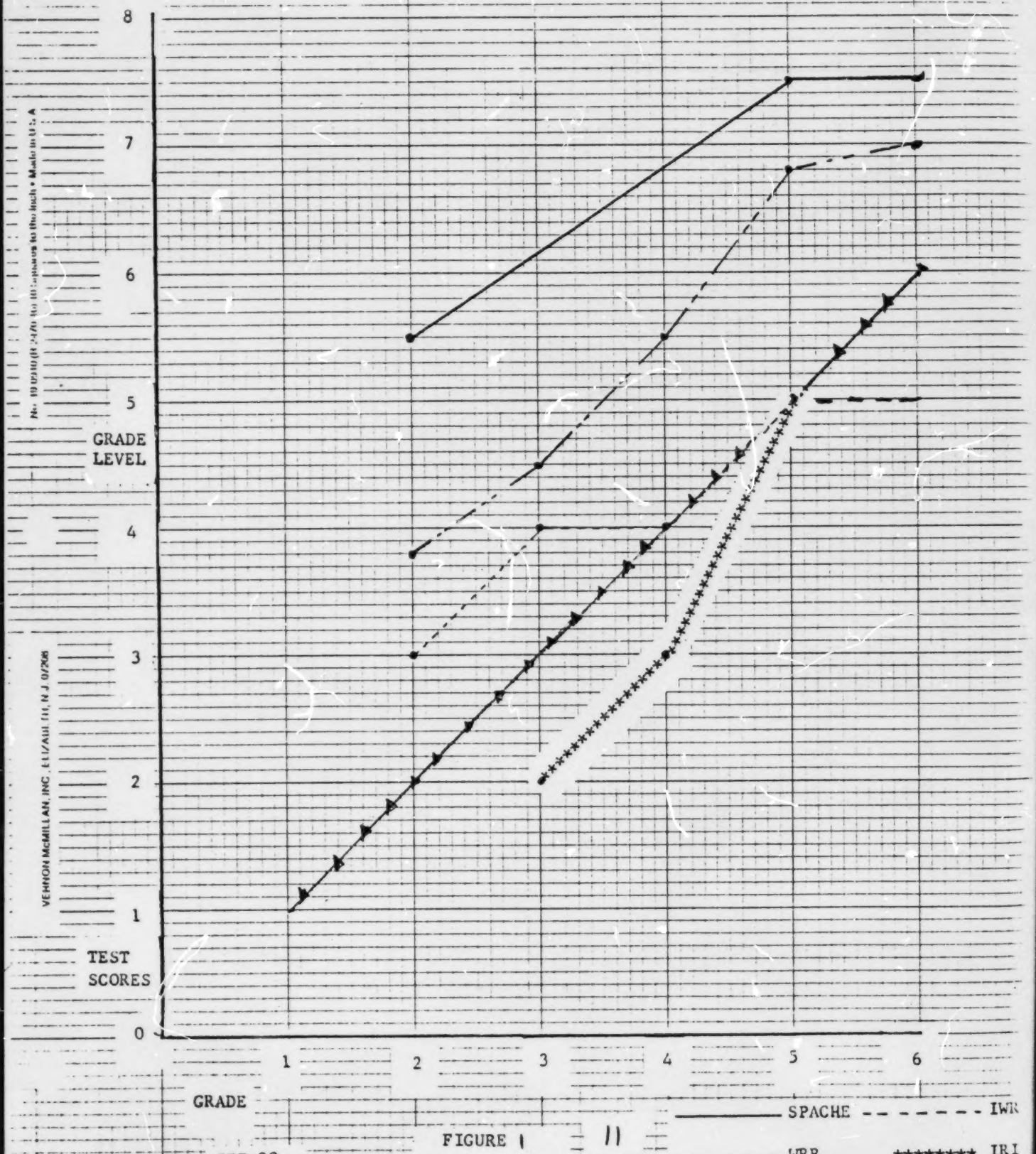

FIGURE 1

GRAPHIC REPRESENTATION
OF
LONGITUDINAL
ACHIEVEMENT CHILD T

T SCILS TIME-39HRS.,47MIN. -10-
ECC-27 MOS.

10.1

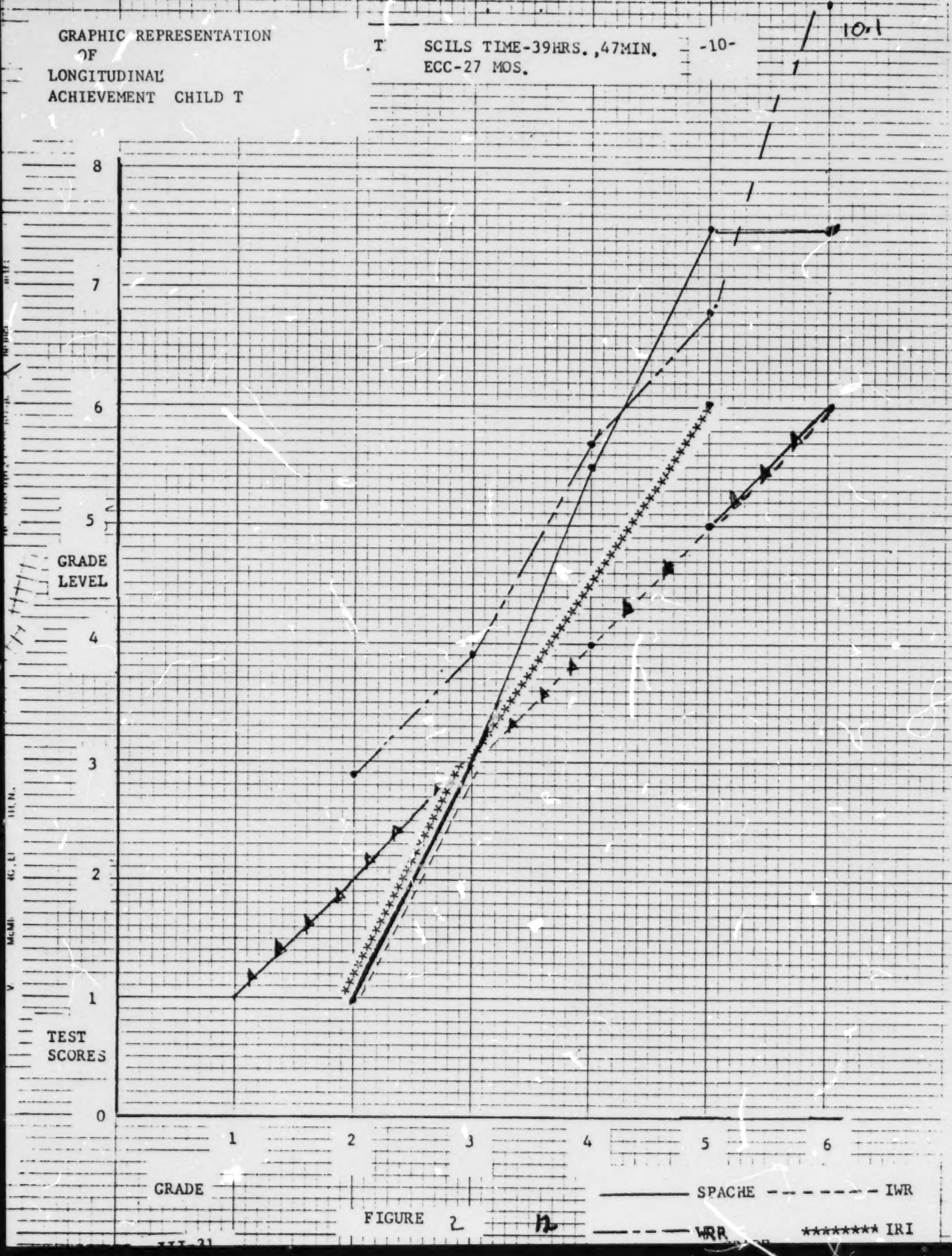

FIGURE 2

THE FOLLOWING IS THE TEST DATA ON THESE CHILDREN

	SCHOOL NOW ATTENDING	SEX	RACE	ECONOMIC STATUS	GRADE	TEST DATE	SCILS TIME	MONTHS ENROLLED E.C.C.	C.A.	WISC VERB	WISC PERF	WISC FULL	PPVT (M.A.)	D.T.V.P. (P.A.) (FROSTIG)	ITPA AUD.	ITPA VIS.	ITPA COMB.	WRA	WRR	IWR (DANIELS)	IRI (SPACHE DCAG. READ SCALE)	IRI BETTS	C.A.T. COMPRE. SCORE GRADE EQUIVALENT
					6	4/78			11-10										7.0	IN5	IND 7.5		
					5	3/77			10-9	103	117	110						5.9	6.8	IN5	IND 7.5	IN 5	
					4	3/76			9-9	97	105	101	10-4	8-2	9-0			5.3	5.5	IN4		IN3	
					3	3/75	33h.	33	8-9				8-11	7-5	8-10	11-0+		4.2	4.5	IN4	IND	IN2	4.5
Child A.		F	B	G	2	3/74	11m.		7-8				8-2	6-3		10-6		2.8	3.8	IN3	5.5	ND	4.8
						6/72			6-0				6-2	5-3			6-4	ND	ND	ND		ND	
						10/71			5-4				5-11	3-6			5-8	ND	ND	ND			
						10/70			4-4				3-2				4-1						
						10/69			3-4				2-1				* *	*	*	*			
					6	4/78			11-5									5.0	10.1	IN6	IND 7.5		
					5	3/77			10-4	119	100	111						4.2	6.8	IN5	IND 7.5		
					4	3/76			9-4	88	78	82	8-9		8-1			4.2	5.7	IN4	IND5.5		
					3	2/75	39h.	27	8-2				7-10	9-0+	8-2	10-6		3.2	3.9	IN3	IN.3	IN3	3.3
Child T.		M	B	G	2	2/74	47m.		7-2				7-0	9-0	7-8	9-0		3.2	2.9	IN1	IN.1	IN1	
						4/72			5-5				3-11				3-3						
						10/71			3-11				2-2	3-8			3-3	*	*	*	*		
						10/70			2-11				* *	* *			* *						

X - C.A. - Chronological Age
Economic Status:
G-Get Set
T-Tuition
SCILS Time

E.C.C. - Early Child-Center
W.I.S.C.(R) - Wechsler Intelligence Scale for Children - (Revised)
VERB - Verval
PERF - Performance
FULL - Full Score

P.P.V.T.-Peaboy Picture Vocabulary Test (M.A.-Mental Age)
D.T.V.P.-Developmental Test of Visual Perception (P.A.-Perceptual Age)
I.T.P.A.-Illinois Test of Psycholinguistic Abilities - AUD -Auditory
VIS -Visual
COMB-Combined
W.R.A.-Wide Range Arithmetic
W.R.R.-Wide Range Reading
I.W.R.-Informal Word Recognition (Daniels Test)
I.R.I.-Informal Reading Inventory (Spache Diagnostic Reading Scale)
(Betts Informal Reading Inventory)
(IN-Instructional Level)
(IND-Independent Level)

C.A.T.-California Achievement Test (Reading Comprehension Score-Grade Equiv.)
IN-Instructional Level
IND-Independent Level
F - Frustration Level
PP-Pre-Primer Level
P.-Premer Level
k-Kindergarten Level
pk-Pre-Kindergarten Level
n-Nursery Level
*-Not Applicable
**-Untestable
n/d-Not Done

the "expected" sequence of development, given his initial intellectual, perceptual and psycholinguistic status, he should now be in a class for, at best, retarded educable with concommitant social and emotional debilitations.

T.'s performance on the T.E.D. test is described below:

> T. was able to properly perceive all three situations (socialization, aggression, and attitude towards learning) and to spontaneously discuss them with very little probing. His resolutions of the situations are all within the top half of the normal samples. His motivation for aggression and socialization are satisfactory; however his motivation for learning is somewhat immature ("his mother insists that he do it.") The feelings he has about these situations also show some immaturity.
>
> The overall picture of T. is one of a child who is capable of perceiving emotional situations and discussing them, but who needs to develop healthier feelings about them. However, given T's past history, it is remarkable that he is capable of properly perceiving these emotion-packed situations and able to talk about them and that he had reasonably mature outcomes for all three situations.

In the light of what has been said here it may be instructive to hypothesize about what has occurred with the two children that have been reported on from a longitudinal perspective. The statement, "the more a child learns the more he uses his cognitive processes," has been used previously in another paper. (1) The literature is replete with studies which appear to indicate a continual decline, a deceleration in the acquisition of skills as well as functional, measured intelligence. Much of this deceleration in educational acquisition has been attributed to the retarding effects of certain environmental conditions. The crux of the matter may well be the decided necessity, especially during the formative years of three to six, to provide for the child an opportunity to learn. For most children,

this is evidently not a problem, since learning takes place with little apparent difficulty. But for a substantial minority, this learning does not take place as normative data would anticipate with a consequent decrease in self-esteem, and an increase in impulsive, sometimes destructive behavior toward themselves and others.

The two case studies reported here exemplify what might occur if early intervention is successful, the anticipated deceleration is halted, the child begins to learn. Cases A. and T. were, even at the age of approximately three, on their way to becoming extremely inadequate learners. Their intellectual functioning was severely retarded, as evidenced by borderline intelligence quotients. Psycholinguistic abilities, as well as visual and perceptual skills, were decidedly under-developed. As they approached first grade with this impoverished learning repertoire, failure would be certain. Negative behavioral adaptation would surely emerge. They would, by the second or third grade, become candidates for special classes, classes for the "educable retarded."

The learning formats developed at the Early Childhood Center apparently were quite effective in reversing this too often repeated story of decline. Once effective learning occurred, these children began to rely increasingly on their cognitive processes, less and less on negative adaptation.

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